

WHAT IS CLAIMED IS:

1. An index guided, buried heterostructure nitride laser diode structure comprising:  
a ridge structure having a first, second, and third surface, said ridge structure comprising a cladding structure and a cladding layer with a multiple quantum well structure interposed between said cladding structure and said cladding layer; and  
a burying layer overlying said first, said second and said third surface of said ridge structure, said burying layer having an opening to said third surface of said ridge structure for electrical contact.
2. The nitride laser diode structure of Claim 1 wherein said cladding structure is a shortperiod superlattice.
3. The nitride laser diode structure of Claim 1 wherein said ridge structure is oriented along the  $\langle 1100 \rangle$  crystallographic direction.
4. The nitride laser diode structure of Claim 1 wherein said burying layer is p-doped.
5. The nitride laser diode structure of Claim 1 wherein a tunnel barrier layer adjoins said multiple quantum well structure.
6. An index guided, buried heterostructure nitride laser diode structure comprising:  
a ridge structure having a first, a second, and a third surface, said ridge structure comprising a cladding structure and a cladding layer with a multiple

quantum well structure interposed between said cladding structure and said cladding layer;

a first burying layer overlying said first, said second and said third surface of said ridge structure, said first burying layer having an opening to said third surface of said ridge structure for electrical contact; and

a second burying layer overlying said first burying layer, such that said second burying layer is in contact with said third surface of said ridge structure.

7. The nitride laser diode structure of Claim 6 wherein said first burying layer is n-doped.
8. The nitride laser structure of Claim 6 wherein said second burying layer is comprised of magnesium doped GaN.
9. The nitride laser structure of Claim 6 wherein said ridge structure is oriented along the <1100> crystallographic direction.
10. The nitride laser structure of Claim 6 wherein said cladding structure is a shortperiod superlattice.
11. A method for making an index guided, buried heterostructure nitride laser diode structure comprising the steps of:

providing a ridge structure having a first, second, and third surface, said ridge structure comprising a cladding structure and a cladding layer with a

multiple quantum well structure interposed between said cladding structure and said cladding layer; and

adding a burying layer overlying said first, said second and said third surface of said ridge structure, said burying layer having an opening to said third surface of said ridge structure for electrical contact.

12. The method of Claim 11 wherein said cladding structure is a shortperiod superlattice.

13. The method of Claim 11 wherein said ridge structure is oriented along the  $\langle 110 \rangle$  crystallographic direction.

14. The method of Claim 11 wherein said burying layer is p-doped.

15. The method of Claim 11 wherein a tunnel barrier layer adjoins said multiple quantum well structure.

16. A method for making an index guided, buried heterostructure nitride laser diode structure comprising the steps of:

providing a ridge structure having a first, a second, and a third surface, said ridge structure comprising a cladding structure and a cladding layer with a multiple quantum well structure interposed between said cladding structure and said cladding layer;

adding a first burying layer overlying said first, said second and said third surface of said ridge structure, said first burying layer having an opening to said third surface of said ridge structure for electrical contact; and

adding a second burying layer overlying said first burying layer, such that said second burying layer is in contact with said third surface of said ridge structure.

17. The method of Claim 16 wherein said first burying layer is n-doped.
18. The method of Claim 16 wherein said second burying layer is comprised of magnesium doped GaN.
19. The method of Claim 16 wherein said ridge structure is oriented along the  $\langle 1100 \rangle$  crystallographic direction.
20. The method of Claim 16 wherein said cladding structure is a shortperiod superlattice.